



«ETTORE MAJORANA» FOUNDATION AND CENTRE FOR SCIENTIFIC CULTURE
TO PAY A PERMANENT TRIBUTE TO GALILEO GALILEI, FOUNDER OF MODERN SCIENCE
AND TO ENRICO FERMI, THE "ITALIAN NAVIGATOR", FATHER OF THE WEAK FORCES



INTERNATIONAL WORKSHOP ON DATA ANALYSIS IN ASTRONOMY «LIVIO SCARSI»

6th Workshop: MODELLING AND SIMULATION IN SCIENCE

ERICE-SICILY: 15 - 22 APRIL 2007

Sponsored by the: • Italian Ministry of Education, University and Scientific Research • Sicilian Regional Government

PROGRAMME AND LECTURERS

ASTROPHYSICS, COSMOLOGY

Simulations for Ultra High Energy Cosmic Ray Experiments
• J. KNAPP, University of Leeds, UK

Simulation of Astrophysical Fluid Flow: Numerical and Computational Challenges
• E. MUELLER, Max-Planck-Institut fuer Astrophysik, Garching, D

Detector Modelling in Astroparticle Physics
• S. PETRERA, INFN & University, L'Aquila, I

BIOLOGY, BIOCHEMISTRY

Biology in the Era of Terascale and Petascale Computing
• K. SCHULTEN, University of Illinois at Urbana-Champaign, Urbana, IL, USA

From Genomes to Protein Models and Back
• A. TRAMONTANO, University "La Sapienza", Rome, I

EARTH, ENVIRONMENT, CLIMATOLOGY

Observations, Simulations, and Modelling of Space Plasma Waves: A Perspective on Space Weather
• V. SONWALKAR, University of Alaska, Fairbanks, AK, USA

Problems and Solutions in Climate Modelling
• A. SUTERA, University "La Sapienza", Rome, I

METHODS AND TECHNIQUES

Optimization Strategies for Modelling and Simulation
• J. LOUCHET, INRIA, Rocquencourt, F

Topological Approaches to Search and Matching in Massive Data Sets
• F. MURTAGH, Royal Holloway - University of London, Surrey, UK

Soft Computing Methods for Data Mining
• S. PAL, Indian Statistical Institute, Kolkata, IND

PURPOSE OF THE WORKSHOP

"Modelling" and "Simulation" are key steps in the study of a System for providing the framework to develop a comprehensive theory for interpretation and prediction of observational data. A "Model", in the Mach approach, is suggested by the existing experimental results and the conditions imposed by general principles in order to justify coherently the observational panorama; its validity is graded by the capacity to suggest new experiments to validate or to contradict hypotheses adopted by the "Theory" in an open path to progress in knowledge and understanding.

A "Simulation" represents a virtual experiment conceived to check the predictions of the "Model" producing the expected results; its input is determinant when injected back in the generator to modify the primitive. This applies in general to the different fields of Science (Astrophysics, Cosmology, Geology, Biology, Economy). Modelling and simulation are strictly interconnected and mutually supporting. Simulations are developed on the basis of models and this interaction generates a powerful critical analysis of the process of using simulated experiments for theory validation. For example, it is possible the assessment with a high level of confidence of a "Data analysis method" by using data from a simulated experiment before applying it on the data set from a real experiment; naturally, whatever the detail of the simulation, the assessment will provide only necessary but not *a priori* sufficient conditions on the validity of the method.

Today simulation by virtual experiments can approximate the real world as it was not conceivable before; the rapid and innovating development of available supports, like the advent of faster nano-technology for grid and massive computing, opens new perspectives for this field which assumes more and more a distinctive individuality involving the effort coordinated of statisticians, data analysts, and computer scientists. The Workshop will address the basic approach to the world of simulation and modelling in three major branches of Science: Astrophysics, Biology and Climatology by reporting on the present status of art and adopted lines of research. The analysis of the interrelation and the impact of new technologies and innovative design on applied fields such as e.g. Medicine, Pharmacology, Earth Environment will represent the logical fallout of the initiative. Today more than ever, it seems well-adequate the phrase, cited by various authors: "A mind is like a parachute. It doesn't work if it is not open".

- PLEASE NOTE
Participants must arrive in Erice on 15 April, not later than 5 pm.

More information about the «Ettore Majorana» Foundation and Centre for Scientific Culture can be found on the WWW at the following address:
<http://www.cesem.infn.it>

POETIC TOUCH

According to legend, Erice, son of Venus and Neptune, founded a small town on top of a mountain (750 metres above sea level) more than three thousand years ago. The founder of modern history — i.e. the recording of events in a methodic and chronological sequence as they really happened without reference to mythical causes — the great Thucydides (~500 B.C.), writing about events connected with the conquest of Troy (1183 B.C.) said: «After the fall of Troy some Trojans on their escape from the Achaei arrived in Sicily by boat and as they settled near the border with the Sicanians all together they were named Elymi: their towns were Segesta and Erice.» This inspired Virgil to describe the arrival of the Trojan royal family in Erice and the burial of Anchise, by his son Enea, on the coast below Erice. Homer (~1000 B.C.), Theocritus (~300 B.C.), Polybius (~200 B.C.), Virgil (~50 B.C.), Horace (~20 B.C.), and others have celebrated this magnificent spot in Sicily in their poems. During seven centuries (XIII-XIX) the town of Erice was under the leadership of a local oligarchy, whose wisdom assured a long period of cultural development and economic prosperity which in turn gave rise to the many churches, monasteries and private palaces which you see today.

In Erice you can admire the Castle of Venus, the Cyclopean Walls (~800 B.C.) and the Gothic Cathedral (~1300 A.D.). Erice is at present a mixture of ancient and medieval architecture. Other masterpieces of ancient civilization are to be found in the neighbourhood: at Motya (Phoenician), Segesta (Elymian), and Selinunte (Greek). On the Aegadian Islands — theatre of the decisive naval battle of the first Punic War (264-241 B.C.) — suggestive neolithic and paleolithic vestiges are still visible: the grottoes of Favignana, the carvings and murals of Levanzo.

Splendid beaches are to be found at San Vito Lo Capo, Scopello, and Cornino, and a wild and rocky coast around Monte Cofano: all at less than one hour's drive from Erice.

APPLICATIONS

Persons wishing to attend the Workshop should apply in writing to:

- Professor Vito DI GESÙ
CITC - University of Palermo
Via Archirafi 34 - 90123 PALERMO, Italy
e-mail: DiGesu@math.unipa.it

specifying:

- date and place of birth together with present nationality;
- degree and other academic qualifications;
- list of publications, present position and place of work.